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AUTHOR Moe, Daniel J.
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ABSTRACT

This study was designed to determine whether children's attitudes and interests with regard to computers and computer science vary by sex, residence status (whether students lived in town or in the country), grade level, and computer usage levels. Subjects were 277 students in grades 4, 9, and 11 in the Watertown, South Dakota, public schools. An attitude inventory was developed and used to measure attitudes toward each of five subscale areas: (1) computer learning-related activities; (2) teacher interpersonal relationships in regard to the computer; (3) aspects of teacher instructional behavior in regard to the computer; (4) the computer, from a personal viewpoint; and (5) the social structure and climate of one's school in regard to computer utilization. A composite score was also computed for each subject. Analysis of variance and F-tests were used to compare mean scores of students in the five areas and the composite score. The study found no significant differences between sexes by any of the grade levels. Attitude scores lowered significantly, however, as grade levels rose. Significant differences were also noted in attitude and interest by usage level and in high school girls who believed that they were being catered to more by teacher contacts and interpersonal relationships. Seventeen references and the computer attitude inventory are included. (LMM)

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THE EFFECTS OF SEX, RESIDENCE STATUS,
GRADE LEVEL, AND USAGE LEVEL ON COMPUTER EQUITY

BY

DANIEL J. MOE

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in partial fulfillment of the requirements
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THE EFFECTS OF SEX, RESIDENCE STATUS
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This research paper is approved as a creditable and independent investigation by a candidate for the degree, Master of Education, and is acceptable for meeting the research paper requirements for this degree. Acceptance of this paper does not imply that the conclusions reached by the candidate are necessarily the conclusions of the major department.

Daniel J. Moore Major Advisor 7-11-84
Date

Dept. Dean 7-11-84
Date

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DJM

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CHAPTER 1

Introduction

"It is the Computer Age." So goes the recent adage. Research might be indicating that there is a gap between certain groups of individuals and their interest in learning computer skills. This is a serious problem as the world of computer technology is rapidly coming upon us and individuals will be required to know at least what the computer is and how it might be affecting their life. It is even more serious if we might unknowingly be educating one group more than others. Do we wish to allow individual's roles to be even more distinctly set? Do we wish to miss out on large amounts of talent? With this new science upon us, we as educators are in the position to insure that all groups of individuals have apt opportunity to learn about this new computer technology. Educators must help to insure that all groups have the same opportunity to learn, and it is towards this end that this study is proposed.

Statement of the Problem.

This study was formulated to determine if there is a difference between certain groups of individuals and their interest in learning computer skills. The study analyzes

attitudes and general relationship between school age children and computers by sex, by residence status, by grade level, by usage level and by separate grade levels by sex. The intent was to do a statistical analysis of an attitude inventory of these groups of individuals and their attitudes towards computers and to review the literature to determine what other researchers have discovered in similar areas of study.

Research questions. For the purposes of this study, the following questions were proposed.

1. Is there a difference in attitude toward computer utilization when compared by sex?
2. Is there a difference in attitude toward computer utilization when compared by residence status, i.e. living in the country or living in town?
3. Is there a difference in attitude toward computer utilization when compared by grade level?
4. Is there a difference in attitude toward computer utilization when compared by a measure of usage level?
5. Is there a difference in attitude toward computer utilization when comparing the males and the females in the different grade levels?

Limitations of the Study.

This study was subject to the following limitations:

1. This writer studied only the students in one district (The Watertown School District) and did not study any other groups.
2. This Watertown School District study only analyzed individuals in the 4th, 9th and 11th grades.
3. Only students of the 11th grade level were analyzed by usage level as the other students were not given hours free to play/work with computers at the Watertown schools.

Procedure of the Study.

The steps of the study were as follows:

1. A topic was selected based on the writer's interest and area of responsibility.
2. The literature was reviewed.
3. An attitude inventory was prepared to analyze individuals' attitudes towards computers.
4. The questionnaire was analyzed for proper questioning techniques and readability for the respondents.
5. Permission was granted by the proper authorities to conduct the study at on-school sites.
6. The study was conducted at the Watertown School District.

7. The study was properly coded and statistical tests were performed through the use of SPSSX (Statistical Package for the Social Sciences 10).
8. The research results were analyzed and the following report written.

CHAPTER 2

Review of the Literature

Comparison by Sex.

A review of the literature of the subject area revealed that there may be differences in the ways that the sexes perceive the computer and related areas of technology in general. Studies have shown (Rose & Menninger, 1978) that as girls progress through school, their interest in mathematics diminishes, starting as early as sixth grade and continuing through junior and senior high school and college. Boswell (1979) in analyzing mathematical attitudes, aptitudes and achievement among elementary school students found that sex-related attitudes about mathematical aptitudes might form as early as 3rd grade -- with both sexes considering mathematics to be a male subject. In 1981-1982 in the state of Michigan an in-depth study (Giese, 1982) was performed analyzing the mathematical data of 113 school districts. This study included numbers and percentages on computer science enrollments for the state. Among the findings were (a) a drop in female enrollment in advanced mathematics regardless of the size of the district and (b) underrepresentation of girls in Computer Science

regardless of school district size (see Figure 1). Another finding in this area (Benbow & Stanley, 1980) suggested that boys and girls sex stereotyping seemed to affect adversely the mathematical achievement of girls in high school.

If one believes in information from a less scholarly, however more popular type of source, Discover (1984) reported that (a) A study from the Center for Social Research at the University of Minnesota showed that a nationwide poll indicated that for 17-year-olds nearly twice as many boys than girls took computer programming courses; (b) A study by the California Department of Education revealed that only 37 percent of the students enrolled in high school computer classes were girls; (c) Social scientists at the University of California at Berkeley found that of those students in the state who have microcomputers at home, boys outnumbered girls by 25 percent; (d) A study at Stanford University indicated that 3 times as many boys as girls attend computer camps across the U.S.; and (e) The 1980 Census indicated that only 23 percent of systems analysts were women and only 31 percent of computer programmers were women. In another study, McKelvey (1984) reported that 34 of 230 boys used computers before and after school and during lunch and recess, while only 3 of 220 girls studied used computers in their free time.

A look at who is teaching computer science on a

Figure 1

Number of boys and girls taking Computer Science in 113
Districts in Michigan 1981-1982.

Actual District Size	Total	# Male	# Female	% Female
10000+	2143	1319	824	38
5000+	2286	1512	774	34
4000+	739	522	217	29
3000+	249	141	108	43
2000+	345	208	137	40
1000+	113	68	45	40
0-999	27	17	10	37
Subtotal	5902	3787	2115	36

nationwide scale revealed that men far outnumbered women in its college instruction. A study conducted by The National Science Foundation (known as The Survey of Scientific and Engineering Personnel Employed at University's and Colleges, January, 1982), revealed that there were 3,259 males and only 446 female instructors teaching computer education in universities and colleges in January of 1982. In a study conducted to determine how a population viewed the prospect of receiving news and information electronically, (Tillinghast & Visvanathan, 1983) it was found that men were more likely to prefer electronic newspapers than women. Half of the men preferred electronic newspapers, as compared with only one-third of the women. This study also revealed a significant difference between men and women in the extent and diversity of their computer usage. Forty percent of the men were heavy computer users, as compared with only 23 percent of the women (see Figure 2).

One facet of the computer revolution is that of the videoarcade arena. An informal study, (Moe, 1984) conducted at a local computer game store indicated that the software sold for home computers offers an array of land battles, space wars and other forms of destruction which seem to be male-oriented sports. One can find on the game packages such titles as Olympic Decathlon (4 male athletes on the cover), Cannonball Blitz (5 men in battle), and Swashbuckler

Figure 2

Difference between men and women in the extent and diversity of their computer use, based on a poll of 529 Stanford University students.

Count Row Pct Col Pct Tot Pct	Female 0	Male 1	Row Total
Computer Use	96 49.0	100 51.0	
1 Low	48.0 18.3	30.7 19.0	196 37.3
2 Med	59 37.8 29.5 11.2	97 62.2 29.8 18.4	156 29.7
3 High	45 25.9 22.5 8.6	129 74.1 39.6 24.5	174 33.1
Column Total	200 38.0	326 62.0	526 100.0

Chi Square = 20.91 with 2 degrees of freedom
 Prob. less than .001
 Gamma = 0.33
 # of missing observations = 3

(7 pirates). Based on this study there seemed to be male oriented bias in video game advertising. According to Dan Guttman (1983), Editor of Videogames Player, "Most games are designed by boys (sic) for other boys" (p. 43). Video games are definitely a part of the computer revolution. However the study, (Moe, 1984) posed the question of whether video games are equally designed for men and women. When game players are asked to zoom through space, dodge asteroids, shoot down enemy cruisers and the like it all requires quick judgement of spatial relationships, and excellent hand-eye coordination. The evidence suggested by Kiesler, Sproull and Eccles (1983) was that boys, on the average, have an advantage over girls in these spatial abilities. Berger (1982, quoted by Kiesler et al.,) a professor of Education at the University of Michigan, conducted a study in which 100 boys and girls were given the chance to practice on a non-warlike (and therefore not sexually biased) video "dart" game in which the players were to estimate the position of a rising balloon, and then try to pop it. At first, girls in this study did worse than boys. But after practicing for 10 complete games each, girls began performing as well as boys.

One alternative according to Bumstead (1982) to help women become involved in the technology/computer revolution was a program in Massachusetts called Project ACT (Access to Careers in Technology); This operated on a Federal Grant and

had as its goal increasing the number of women enrolled in post-secondary technical education. This program offered workshops and individual counselling that enabled women to make judgements about careers in technology. It also offered support and motivation to help women in overcoming real and psychological barriers to obtaining traditionally male-dominated occupations.

Armstrong (1980) identified three variables that were effective in alleviating math anxiety and increasing participation in mathematics programs which might prove to be useful in increasing female participation in computer science programs as: (a) a positive attitude toward the subject; (b) a perceived need for mathematics (possibly computer science) in order to achieve future career and education goals; and (c) the influence of parents, teachers and counselors.

Comparison by Residence Status.

While there was no data available on the subject of attitude toward computer utilization with residence status there was a limited amount of data available on the subject of computer literacy/knowledge and minority groups. While there is some dispute as to exactly how computer literacy will pay off for today's students when they enter the job market, the U.S. Labor and Commerce Departments (Johnson, 1982) predicted that by the end of the decade, 50 to 75 per-

cent of the jobs will be computer related. It seems obvious that job applicants most qualified to perform the growing number of high-technology jobs that are appearing will be the individuals with the highest degree of computer literacy. One theorist, Alvin Toffler stated that "As home computers proliferate ... white, middle-class children will start out, once more, with an edge that the less affluent lack" (p. 32). A look at research findings into related areas revealed insight into this area. According to Campbell (1982) in Black Enterprise magazine, "Blacks are 7 times less likely to become scientists and 12 times less likely to become engineers than whites" (p. 22). The National Assessment of Educational Progress Studies (Johnson, 1982) revealed that at ages 9, 13 and 17, whites outscore both blacks and hispanics in knowledge and skill application in mathematics by 13 to 20 percentage points.

Part of the problem is financial. According to Dr. Carl Soloman, Title 1 evaluator for funded programs in District 16, encompassing elementary and junior high schools in Brooklyn, New York, (Johnson, 1982) "We have some computers" ... "we're not getting the money we need. And those districts with more money are going to be ahead of us" (p. 24). According to Dr. Beverly Cole (1982) of the educational division of the NAACP "Inner city schools in general, just are not developing computer education as fast as

wealthier district's" (p. 23). A survey by Market Data Retrieval Inc. (Johnson, 1982) revealed the statistic that 30 percent of the country's 2,000 largest and richest public high schools now have at least one microcomputer, while 60 percent of the 2,000 poorest schools have none.

The Congressional Office of Technology Assessment (OTA) recently completed a study of the impact of the information revolution on American education (Johnson, 1982). It directed Congress to (a) consider developing Federal policies for manpower retraining in a computer age, (b) develop programs to insure that minorities are not left out, and (c) help local educational leaders cope with computer technology. Unless action is taken now concluded the OTA "A significant social, economic and political gap could develop between those who do and those who do not have access to, and the ability to use, information systems" (p. 23). According to Johnson, to reduce this computer gap Congress has been considering legislation to greatly expand tax breaks for computer manufacturers who donate equipment to elementary and secondary schools. Johnson stated that with the right tax break, Apple Computer would donate a computer to each of the 80,000 public schools in the country. This company believes profits would come from schools buying additional equipment and programs from Apple computer and parents might be persuaded into buying Apple computers for the home.

CHAPTER 3

Design of the Study

Research Population.

The students included in this study were entirely from the Watertown, South Dakota public schools. Grades 4, 9 and 11 were surveyed. A total of 277 students completed the attitude inventory. Eleven student responses were eliminated due to incomplete data. The breakdown for the research categories were presented in Table 1.

Instrument.

The questionnaire (See Appendix) was adapted from the book Attitude Toward School K-12, Instructional Objectives Exchange (1972) and Conducting Educational Research, (Tuckman, 1972). A panel of three judges reviewed this particular instrument for its content validity. Dr. Gary Steinley, a professor at SDSU specializing in reading reviewed the instrument for its readability for the respondents. Dr. Carl Edeburn, a research professor at SDSU reviewed the instrument for its capabilities to measure what it was designed to measure. Mr. Doug Meyers, a curriculum specialist (K-12) for the Watertown public schools, analyzed

Table 1
Summary of population categories by grade levels.

Grade Level	Male	Female	Usage Level		
			Low	Medium	High
Grade 4	45	40			
Total = 85					
Grade 9	47	50			
Total = 97					
Grade 11	41	43	61	9	14
Total = 84					

(Residence Status)

Students living in town	204
Students living in the country	62

the instrument for his students in his particular school system. The intent of the questionnaire was to summarize different student's responses on the basis of the following five areas and a composite score:

1. Learning -- defined as an expressed tendency to approach rather than avoid computer learning-related activities.
2. Interpersonal -- defined as having a favorable attitude towards teacher interpersonal relationships, in regard to the computer.
3. Mode of Instruction -- defined as having a favorable attitude toward aspects of teacher instructional behavior in regard to the computer.
4. Personal -- defined as one's personal attitudes towards the computer.
5. Social Structure and Climate -- defined as a favorable attitude toward the social structure and climate of one's school in regard to computer utilization.

Questions were scored by means of a Likert scale response pattern as follows; 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree and 5 = strongly agree. Questions which were negatively worded (Questions 5, 8, 14, 15, 18, 21, 22) were reversed in the evaluation/scoring process. That is these particular questions were subsequently scored (5=1) (4=2) (3=4) and (1=5). This was to help bring

out the true nature of the subscale areas so that for all of the questions in the subscale areas a higher mean reported indicated a higher interest in that subscale area.

The computer usage level was evaluated as follows:
 Low usage level, (1) indicated a user who had used the computer center outside of class 1-10 times this school year.
 Medium usage level, (2) indicated a user who had used the computer center outside of class 11-25 times this school year.
 High usage level, (3) indicated a user who had used the computer center outside of class 25 times or more this school year.

The following questions comprised the subscale of Learning. All questions which were reversed were noted with an asterisk (*).

- * 5. I hate homework having to do with computers.
- 10. I enjoy working on puzzles on computers.
- 11. I enjoy trying to solve difficult problems on computers.
- 12. I like the challenge of a difficult assignment on computers.
- 13. I would be interested in knowing more information about computer subjects.
- *14. I feel discouraged in learning about computers because the "language" of computers is hard to understand.
- 20. Computer classes are my favorite classes.

*21. My computer assignments are often too difficult.

*22. I have to memorize too many facts about computers.

27. I would like to attend a computer camp or workshop pertaining to computers.

The following questions comprised the subscale area of Interpersonal relationships with the Teacher.

9. I enjoy talking to my teacher about computers after class.

*18. The teacher is impatient when I don't pick up information about computers.

26. The teacher seems interested in the things I do on the computer.

29. The teacher likes working with me on the computer.

The following questions comprised the subscale area of Mode of Instruction.

6. The teacher makes the subject of computers very interesting to me.

23. The teacher encourages me to think for myself concerning computers.

The following questions comprised the subscale area of Personal.

3. In the past I have spent more than 10 hours in a week using computers.

4. My family encourages me to use computers.

24. If I had a microcomputer at home, I would use it often.
25. I would like to go to a video-arcade more than 3 times a week.
28. Each morning I look forward to coming to school so that I can work on computers.
30. I have a positive attitude towards computers.
31. I enjoy using computers.
33. My future goals include computers.
34. I do my best in working with computers.
35. Computers are important to me because I find many of the things I learn are useful.

The following questions comprised the subscale area of Social Structure and Climate.

1. I like computer classes because they seem to be interesting.
- * 8. I think that there is too much pressure when working on computers.
- *15. I often feel rushed and nervous when I work on computers.
16. My friends of the same sex have a positive attitude towards computers.
17. I am very interested in what goes on in the computer center.

Questions 2, 7, 19, 32, 36 were omitted from any subscale.

Method of Analysis.

The analysis of variance (ANOVA) and F-Tests were used to compare means of students in the five areas as well as for the composite score. These five subscale areas were analyzed by sex, by residence status (bus/town), by grade level, by usage level (11th grade only) and by grade by sex. The .05 level of significance was chosen as a criterion of significance.

CHAPTER 4

Analysis of the Data

As noted above, five research questions were examined. The analysis of data for these five questions will be found below.

Comparison by Sex.

A summary of the means, F Values and probability levels for the subscales by sex were reported in Table 2. As noted, none of the mean differences by sex were significant beyond the .05 level of probability. In fact the summary revealed that there was really no difference in the attitude towards computer utilization by sex.

Comparison by Residence Status.

A summary of the means, F Values and probability levels for the subscales by bus/town were reported in Table 3. As noted, none of the mean differences by bus/town were significant beyond the .05 level of probability. The summary does reveal that the subscale areas of Personal and Social Structure appear to approach significance with the probabilities of .14 and .20 with town students expressing a higher attitude (Means = 30.63 - 32.20 and 15.60 - 16.37

Table 2

Summary of means and F values by subscale by sex.
(N=266) Overall 4th, 9th, 11th grades.

Subscale	Males (n=133)	Females (n=133)	F	P
Learning	31.06	31.62	.29	.594
Interpersonal	12.29	12.44	.16	.692
Mode of Instruction	6.67	6.78	.23	.633
Personal	31.80	31.87	.01	.934
Social Structure	16.14	16.24	.04	.839
Composite	98.02	98.95	.13	.719

Table 3

Summary of means and F values by subscale by bus/town.
(N=266) Overall 4th, 9th, 11th grades.

Subscale	Bus (n=62)	Town (n=204)	F	P
Learning	30.63	31.55	.56	.454
Interpersonal	12.45	12.34	.06	.809
Mode of Instruction	6.76	6.72	.02	.879
Personal	30.63	32.20	2.17	.142
Social Structure	15.60	16.37	1.64	.202
Composite	96.06	99.23	1.05	.306

respectively).

Comparison by Grade Level.

A summary of the means, F Values and probability levels for the subscales by grade level were reported in Table 4. As can be noted, a highly significant difference was reported in all 5 subscale areas and the Composite area. The means were lowest in all 5 areas and the Composite area for the 11th grade. Note that there seems to be a pattern in that the means generally drop from the 4th to the 9th grade.

Comparison by Usage Level. (11th grade only).

A summary of the means, F Values and probability levels for the subscales by usage level were reported in Table 5. As can be noted, there was a significant difference reported in the subscale areas of Personal, Social Structure and Composite score. A linear relationship between attitude and usage was revealed in the means of the Personal subscale, (Means = 26.74, 30.11, and 33.86 respectively) as well as in the Composite score where the means ranged from 81.52 (in the low usage category) to 82.44 (in the medium usage category) to 94.79 (in the high usage group). Although the Social Structure subscale did not show this linear relationship there was a difference (low = 13.02, medium = 12.89, high = 15.71) between low and high

Table 4

Summary of means and F Values by subscale by grade level.
(N=266)

Subscale	Fourth (n=85)	Ninth (n=97)	Eleventh (n=84)	F	P
Learning	37.33	31.00	25.67	56.87	.001
Interpersonal	13.08	13.09	10.81	17.68	.001
Mode of Instruction	7.35	7.13	5.62	24.32	.001
Personal	33.53	33.42	28.29	15.84	.001
Social Structure	19.13	15.98	13.45	55.69	.001
Composite	110.42	100.74	83.83	45.44	.001

Table 5

Summary of means and F values by subscale by usage level.
(N=84) 11th grade only.

Subscale	Low (n=61)	Medium (n=9)	High (n=14)	F	P
Learning	25.34	24.44	27.86	1.00	.372
Interpersonal	10.82	9.67	11.50	1.80	.172
Mode of Instruction	5.61	5.33	5.86	.34	.712
Personal	26.74	30.11	33.86	6.60	.002
Social Structure	13.02	12.89	15.71	4.96	.009
Composite	81.52	82.44	94.79	3.56	.032

usage level. Other subscale areas did not show a significant difference, however in all 5 subscale areas low usage levels had the lowest attitudes and high usage level had the highest attitudes.

Comparison by Grade 4 by Sex.

A summary of the means, F values and probability levels for the subscales for grade 4 by sex were reported in Table 6. As noted, none of the mean differences by sex were significant beyond the .05 level of probability. The Mode of Instruction subscale area approached significance with a probability level of .13 with the males demonstrating a more positive attitude than the girls, (Male mean = 7.67; Female mean = 7.00). This summary revealed however that there was really no difference in the attitude toward computer utilization for grade 4 by sex.

Comparison of Grade 9 by Sex.

A summary of the means, F Values and probability levels for the subscales for grade 9 by sex were reported in Table 7. As noted, none of the mean differences by sex were significant beyond the .05 level of probability. In fact, the summary revealed that there was no difference in the attitude toward computer utilization in grade 9 by sex.

Comparison of Grade 11 by Sex.

A summary of the means, F Values and probability

Table 6

Summary of means and F Values by subscale by grade 4 by sex.
(N=85)

Subscale	Males (n=45)	Females (n=40)	F	P
Learning	36.82	37.90	.60	.441
Interpersonal	13.31	12.82	.48	.491
Mode of Instruction	7.67	7.00	2.28	.135
Personal	34.20	32.78	1.16	.286
Social Structure	19.01	19.20	.03	.856
Composite	111.06	109.70	.16	.688

Table 7

Summary of means and F Values by subscale by grade 9 by sex.
(N=97)

Subscale	Males (n=47)	Females (n=50)	F	P
Learning	30.43	31.54	.46	.501
Interpersonal	12.76	13.40	1.02	.314
Mode of Instruction	6.96	7.30	.94	.334
Personal	33.79	33.08	.22	.643
Social Structure	15.87	16.08	.07	.796
Composite	100.02	101.40	.10	.753

levels for the subscales for grade 11 by sex were reported in Table 8. As can be noted, the Mode of Instruction subscale area reported a significance difference with the girls demonstrating a more positive attitude than the boys (Male mean = 5.24; Female mean = 5.97). In the case of the Personal subscale area the difference reported approached significance (Prob. = LT .08) with the girls demonstrating a more positive attitude than did the boys (Male mean = 26.88; Female mean = 29.63). None of the other subscale areas were significant.

Table 8

Summary of means and F Values by subscale by grade 11 by sex.
(N=84)

Subscale	Males (n=47)	Females (n=50)	F	P
Learning	25.46	25.86	.08	.784
Interpersonal	10.63	10.98	.47	.495
Mode of Instruction	5.24	5.97	5.36	.023
Personal	26.88	29.63	3.10	.082
Social Structure	13.22	13.67	.45	.502
Composite	81.44	86.12	1.53	.219

CHAPTER 5

Summary, Conclusions and Recommendations

Summary.

This study has attempted to analyze the relationship between a number of variables and attitude toward computer utilization. These variables were sex, residence status, grade level, usage level and grades 4, 9 and 11 by sex. The conclusions that follow were based on these research findings and from the literature reviewed.

Conclusions.

Question 1. Is there a difference in attitude toward computer utilization when compared by sex? This research study as an overall comparison indicated that there were no differences when all students were compared by sex. However, statistics in the literature revealed that women do not take higher mathematics courses and information from a statewide study in Michigan (Giese, 1982) revealed that women are clearly underrepresented as a whole in that state in computer science. Another research finding (Kolata, 1984) reported that (a) of students polled in California who have microcomputers at home, boys outnumbered girls by 25%;

(b) In a California Department of Education study only 37% of the students enrolled in high school computer classes were girls; and (c) In a nationwide poll conducted by the University of Minnesota of 17-year-olds nearly twice as many boys than girls take computer programming courses. Though many research findings seem to indicate a difference in computer utilization by sex, this study failed to ascertain it. This may be due to the quality of Watertown public schools computer education/instruction. The quality of Watertown computer education may be high; the program has been in operation since 1978 and even received a visit from the U.S. Secretary of Education to review the program. This may show only that in Watertown, South Dakota there is a good system. This particular finding may also be credited to the coordinator for Computer Science education/curriculum programs in Watertown public schools who is a female.

Question 2. Is there a difference in attitude toward computer utilization when compared by residence status, i.e. living in the country or living in town? A review of the literature finds no information on this topic. However, clearly school districts with less money to buy computer systems will not have adequate programs. The responses of persons living in the country and therefore further removed from activity on the computer systems, according to this study approached significance in the

subscale areas of Personal and Social Structure when compared (as an overall comparison) to persons living in town. This could possibly mean that having less access to computers and less social group pressure to join the computer revolution might cause an individual to regard it less. However again, the difference was not significant and therefore not a probability.

Question 3. Is there a difference in attitude toward computer utilization when compared by grade level? This study indicated a significant difference in all subscale areas by cross-analyzation from 4th to 11th grade. The mean in all subscale areas fell from 4th to 11th grade. This indicated that the highest attitude towards computer utilization in all subscale areas was revealed in the responses of 4th grade and the lowest in the 11th grade. The exact reason why attitudes dropped from the 4th to the 11th grade is unclear. It does seem clear, however that having computers associated with 4th graders causes familiarity and thus a more positive attitude.

Question 4. Is there a difference in attitude toward computer utilization when compared by a measure of usage level? This research was limited to responses of 11th grade students. The subscale areas of Personal and Social Structure revealed significant differences. This indicated that the computer center is a social area. Those indivi-

duals with high usage level have high social and personal attitudes towards computers, significantly higher than those individuals with low usage levels.

Question 5. Is there a difference in attitude toward computer utilization when comparing the males and the females in the different grade levels? This research study indicated no difference between males and females by 4th grade and also by 9th grade. In 4th grade, the Mode of Instruction subscale area approached significance with the boys exhibiting a more positive attitude than the girls. The boys in the 4th grade consider one-to-one communication with the teacher higher than the girls of that grade level. When comparing males and females of 11th grade by sex a significant difference was reported in the Mode of Instruction area. 11th grade girls demonstrated a more positive attitude toward computer utilization than the boys. So if one has an open mind it seems that 4th grade boys are being catered to by the teacher more than the girls of that grade level, (though not significant) and 11th grade girls believe that they are being favored more than the boys of that grade level (significant). This particular finding (not negative in this author's opinion), may be attributed to one of two things: (a) Girls in the 11th grade responded higher to questions in the Mode of Instruction area than the boys to not make it appear that the boys were being catered

to more; or (b) the effective operation of the program in the Watertown public schools. This author believes it is the latter as the questions involved in the Mode of Instruction area were (a) The teacher makes the subject of computers interesting to me, and (b) The teacher encourages me to think for myself concerning computers; and this author believes student responses to the mode of instruction subscale were accurate and forthright.

Recommendations.

In reviewing the process of this study, the researcher submits the following improvements/advancements to any attempting replication:

1. Eliminate questions not used for the attitude inventory.
2. Make usage categories open and have students' estimate number of hours per week so that the research study can balance the weight of the groups.
3. Include more questions in the controversial Mode of Instruction subscale area.
4. Have a more equal balance of town vs. rural population. The study in Watertown was basically a populated area analysis.
5. In analyzing many of the subscales different populations could have been used from around the

state. To analyze student responses in Watertown may be a miscalculation in that it may already be a much analyzed district.

Research needs to be done in this area of analyzing computer utilization by this research and other questions. We are now realizing a discrepancy between minority groups and computer knowledge and have yet to realize that there may be differences between males and females in this area, also the area needs to be explored by grade levels to ascertain when and where changes might occur.

1. Why do 4th graders in this study regard computers in all subscale areas higher than 11th graders?
2. Is part of the problem in teacher instruction?
3. Is there possibly an ethnic group relationship?
4. Is there a difference by residence status; do we possibly need a nationwide look?
5. What can we do to insure that all groups have access to computer knowledge in general?

This research study focused only on ascertaining differences between certain groups of individuals and their attitude towards computer utilization. Other types of research into this area need to be explored.

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Would you please indicate the following information at the top of your answer sheet.

Male or Female

Grade Level

Computer Usage Level

Ride Bus/Live in Town

1-10 times = 1

11-25 times = 2

25+ times = 3

1 2 3 4 5
strongly disagree disagree neutral agree strongly agree

- 1) I like computer classes because they seem to be interesting.
strongly disagree disagree neutral agree strongly agree
- 2) The school has too many rules for working with computers.
strongly disagree disagree neutral agree strongly agree
- 3) In the past I have spent more than 10 hours in a week using computers.
strongly disagree disagree neutral agree strongly agree
- 4) My family encourages me to use computers.
strongly disagree disagree neutral agree strongly agree
- 5) I hate homework having to do with computers.
strongly disagree disagree neutral agree strongly agree
- 6) The teacher makes the subject of computers very interesting to me.
strongly disagree disagree neutral agree strongly agree
- 7) In my school boys tend to dominate the computer center.
strongly disagree disagree neutral agree strongly agree
- 8) I think that there is too much pressure when working on computers.
strongly disagree disagree neutral agree strongly agree
- 9) I enjoy talking to my teacher about computers after class.
strongly disagree disagree neutral agree strongly agree
- 10) I enjoy working on puzzles on computers.
strongly disagree disagree neutral agree strongly agree
- 11) I enjoy trying to solve difficult problems on computers.
strongly disagree disagree neutral agree strongly agree
- 12) I like the challenge of a difficult assignment on computers.
strongly disagree disagree neutral agree strongly agree
- 13) I would be interested in knowing more information about computer subjects.
strongly disagree disagree neutral agree strongly agree
- 14) I feel discouraged in learning about computers because the "language" of computers is hard to understand.
strongly disagree disagree neutral agree strongly agree
- 15) I often feel rushed and nervous when I work on computers.
strongly disagree disagree neutral agree strongly agree
- 16) My friends of the same sex have a positive attitude towards computers.
strongly disagree disagree neutral agree strongly agree
- 17) I am very interested in what goes on in the computer center.
strongly disagree disagree neutral agree strongly agree
- 18) The teacher is impatient when I don't pick up information about computers.
strongly disagree disagree neutral agree strongly agree

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- 19) I would rather play games on computers that are new to me than play games that I already know.
strongly disagree disagree neutral agree strongly agree
- 20) Computer classes are my favorite classes.
strongly disagree disagree neutral agree strongly agree
- 21) My computer assignments are often too difficult.
strongly disagree disagree neutral agree strongly agree
- 22) I have to memorize too many facts about computers.
strongly disagree disagree neutral agree strongly agree
- 23) The teacher encourages me to think for myself concerning computers.
strongly disagree disagree neutral agree strongly agree
- 24) If I had a microcomputer at home, I would use it often.
strongly disagree disagree neutral agree strongly agree
- 25) I would like to go to a video-arcade more than 3 times a week.
strongly disagree disagree neutral agree strongly agree
- 26) The teacher seems interested in the things I do on the computer.
strongly disagree disagree neutral agree strongly agree
- 27) I would like to attend a computer camp or workshop pertaining to computers.
strongly disagree disagree neutral agree strongly agree
- 28) Each morning I look forward to coming to school so I can work on computers.
strongly disagree disagree neutral agree strongly agree
- 29) The teacher likes working with me on the computer.
strongly disagree disagree neutral agree strongly agree
- 30) I have a positive attitude towards computers.
strongly disagree disagree neutral agree strongly agree
- 31) I enjoy using computers.
strongly disagree disagree neutral agree strongly agree
- 32) I believe that computers are mainly for males.
strongly disagree disagree neutral agree strongly agree
- 33) My future goals include computers.
strongly disagree disagree neutral agree strongly agree
- 34) I do my best in working with computers.
strongly disagree disagree neutral agree strongly agree
- 35) Computers are important to me because I find many of the things I learn are useful.
strongly disagree disagree neutral agree strongly agree
- 36) I might be more interested in computers if they were more related to the skills I'll need after I graduate.
strongly disagree disagree neutral agree strongly agree